A SMOKE POLE SAGA: PART II – IRONS & OPTICS

STEVEN MAICHAK *NOVEMBER 23, 2018*

Please refer to *A Smoke Pole Saga: Part I - The Recipe* for more specifics on the routine I used at the range as an efficient shooting and cleaning regimen.

The following picture tutorial will walk readers through my own experience and challenges overcome while completing the process mentioned above.

Ingredients:

December 17

I already had a fine muzzleloader in my #11 percussion cap powered Knight LK-93, but my dad surprised me with an upgrade to a new stainless T/C Impact!

Listed below are the ingredients for my particular concoction. You'll notice many of them are not considered top of the line options. As they say, “sometimes simple is better.”

T/C Impact .50 caliber muzzleloader
Weaver one-piece scope base
Leupold scope rings
Nikon Pro Staff 3-9×40
CCI 209 Shotshell primers
Hodgdon Pyrodex RS powder
Harvester Muzzleloading Crush Rib sabots
Hornady .44 caliber 240 grain XTP bullets

Preparation:

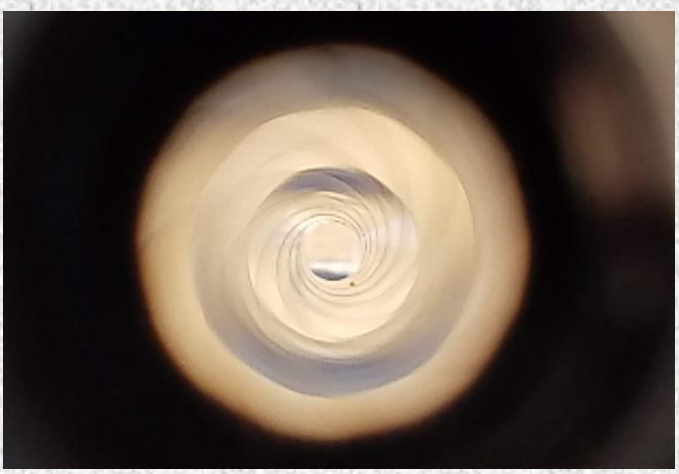
Consistency is critical to all types of firearms if supreme precision and accuracy are desired. For muzzleloaders, that includes starting your sabot and bullet the same way each and every time. I kept it simple by remembering the sabot ‘leaves’ need to be oriented in the 12-, 3-, 6-, and 9-o’clock positions, respectively. After a little repetition it’s easy to remember even in a hurried reload.

From there, it’s one smooth, firm motion to seat the bullet. There’s no need to “hammer” over and over as that will deform the nose of the bullet.

Below is a picture of how the barrel looks after two shots.

I found using seven cleaning patches on both sides pretty well brings the barrel to a mirror finish.

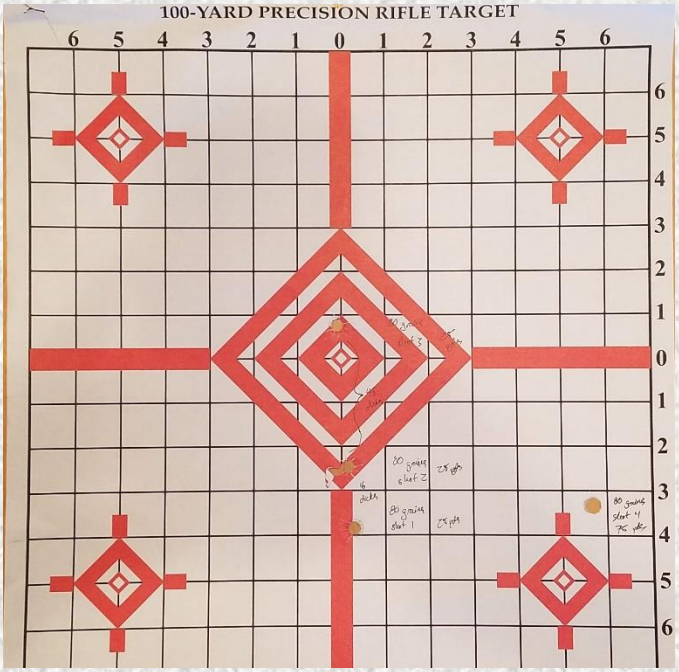
The following image on the next page is what the barrel looks like after I run the cleaning patches – white glove approved!



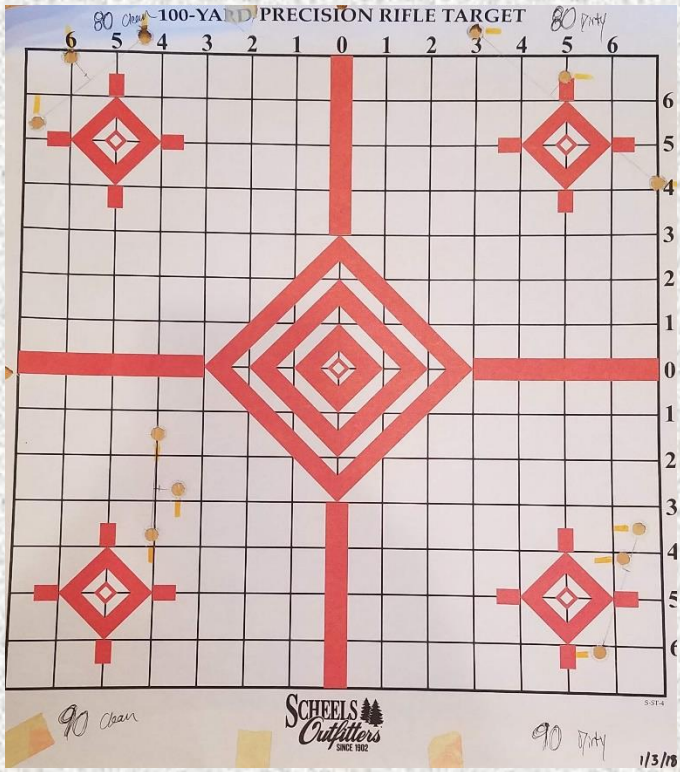
Now, we'll move on to the meat of this tutorial.

January 3

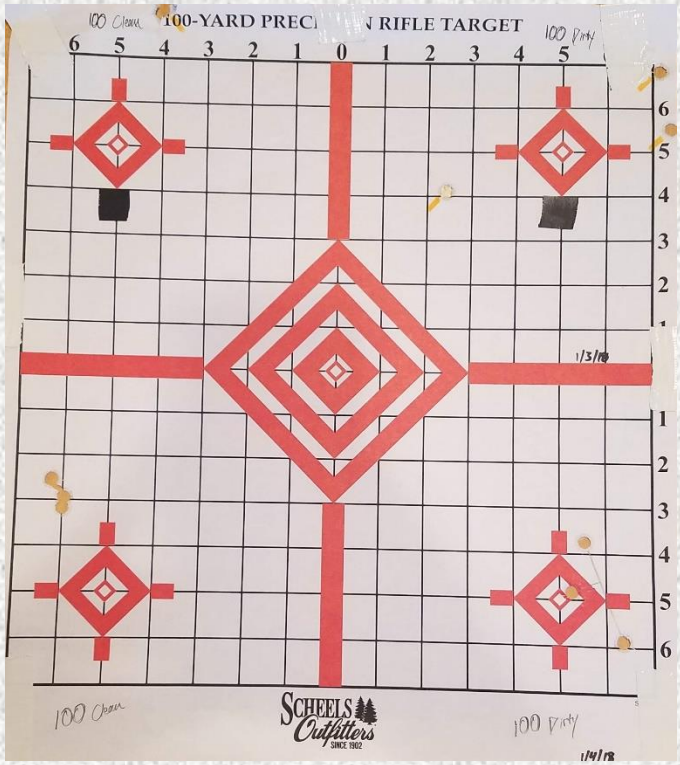
Three shots at 25 yards with 80 grain powder charges were the price to get on paper. After a quick scope adjustment, I followed up with one shot at 75 yards to confirm I could back up to 100 yards after a thorough deep clean of the gun.



I then shot two groups each of both 80 and 90 grain powder charges at a 100 yard distance.

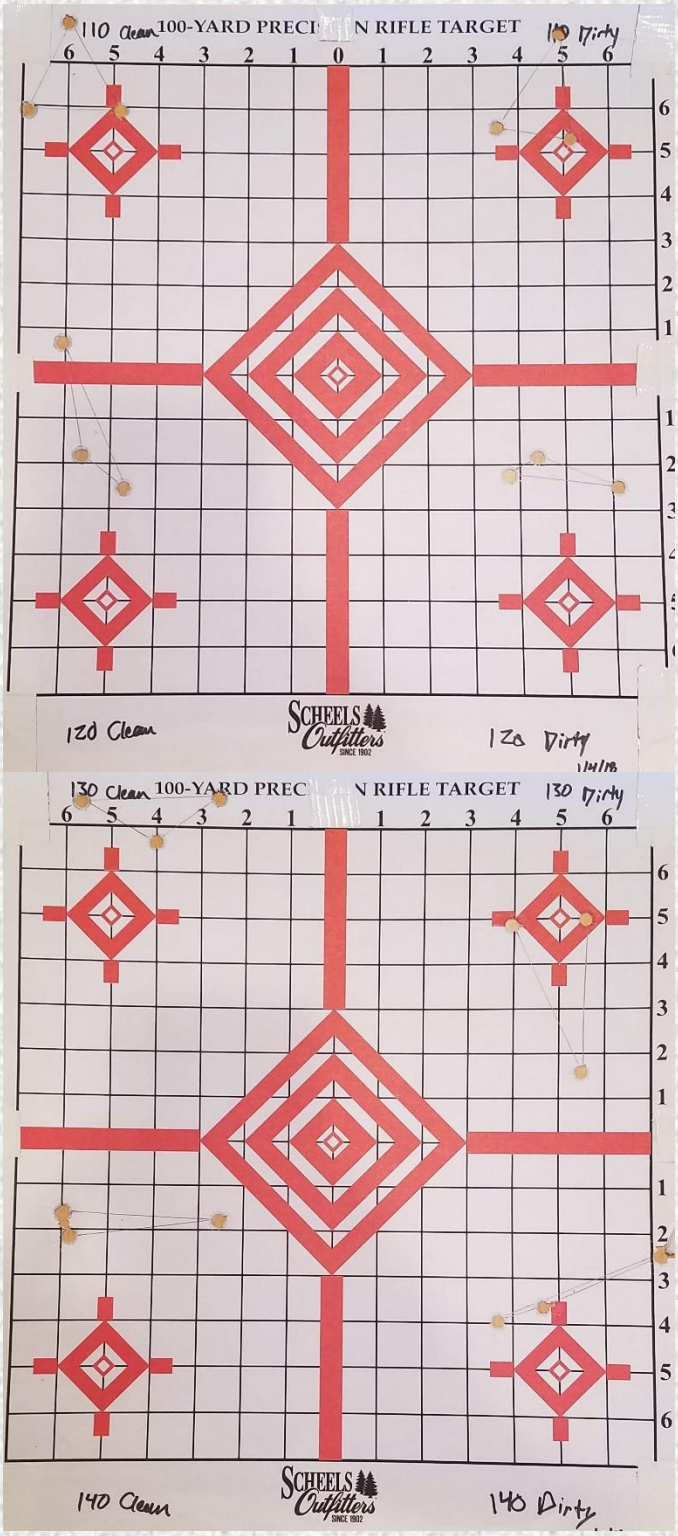


I went ahead and did the same for 100 grains, but multiple rounds were off paper above the target making it an easy reason to call it a day.



January 4

Another couple groups of 100 grain charges was in order (seen in the bottom half of the previous image) in order to get a proper representation of how the gun shoots with that load. I then continued the procedure with loads all the way up to 140 grains in 10 grain increments.



Pretty much all groups were mediocre results at best. I recognized I was experiencing some fatigue that surely opened up my groups. Furthermore, a better gun rest would improve the gun's performance.

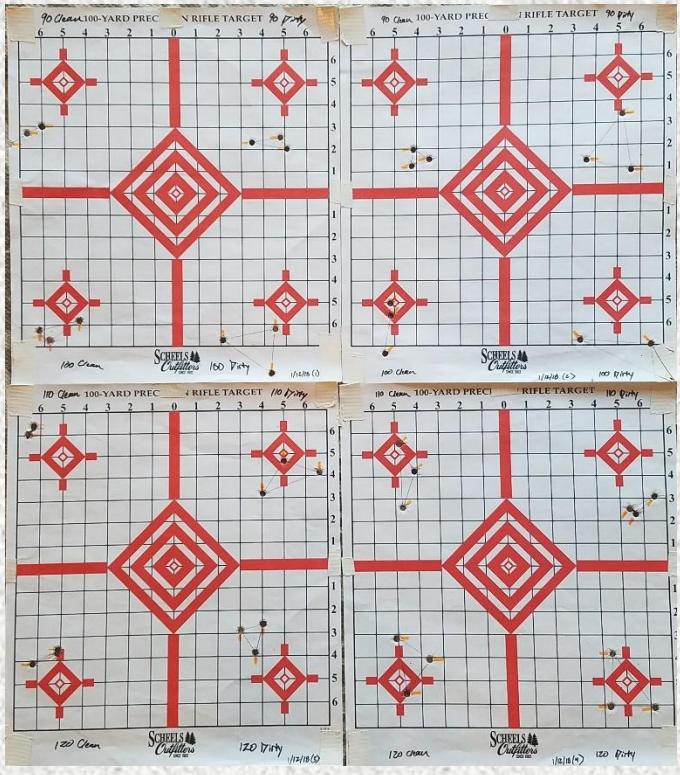
January 8

I made a rear gun rest using short lengths of stacked pool noodles and some extra paracord I had laying around. Of course, an old camo shirt does well disguising the pink eye sore contained within.

Used in concert with a bipod attached to the front of the rifle, they made for a much more stable platform.

January 12

Since I wasn't satisfied with the first progression a week before, I decided to redo the whole process with four loads ranging from 90-120 grains of powder.



I still cleaned the barrel after each pair of clean and dirty barrel shots, but I experimented a bit by only cleaning

the breech plug after completing a full set of both clean and dirty groups (once every six shots). I was pleased to find the Impact fired each round without issue.

All things considered, I was excited to get positive results despite the high winds that day.

Once again, the 90 and 120 grain loads were the most consistent by both group size and group deviation. Since the 120 grain load delivers the projectile at a higher velocity, I chose it as the best load for my particular gun.

January 17

I was feeling frisky the morning of January 17th and decided my first group would be a three shot group without cleaning anything in between shots. The results in the following picture speak for themselves.

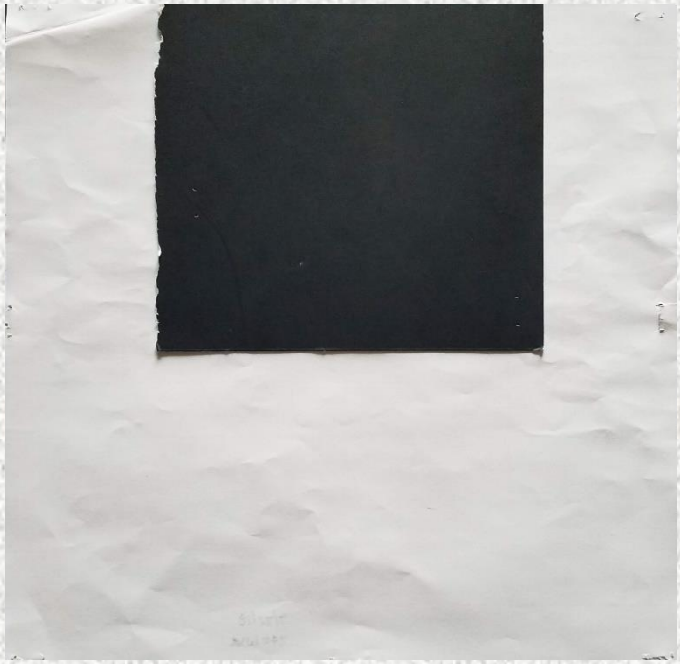
It was then time to start tuning the iron sights because some states, like Colorado, restrict their muzzleloader seasons to only allow for iron sights.

The three pictures above show the scope base on the gun without interrupting use of the iron sights.

Still in the frisky mood, I took a chance on the irons at 100 yards after a rough bore sight at the same distance. With the rear sight fully bottomed out in its adjustable range the first shot hit paper 4” high and 4” right. The second shot landed perfectly on the y-axis 3.5” right.

That showed me aligning the sights for windage while shooting is easier than getting the elevation correct. It was tough to aim with the iron sights at a target intended for use with scopes, so I colored the target with a marker to increase the visual contrast. However, I found I still needed a darker mass for my eyes to pick up.

I like to use a black piece of paper with a larger white sheet of paper as the background because that combination creates a clear contrast that is easy to see and aim at with iron sights. I cut the black box as narrow as my eyes can see at the 100 yard distance (about 4-6” wide). I then treat the bottom edge of the black box as the y-axis of the bullseye and “rest” the black box on top of my iron sights.



After cleaning the gun I switched to another target that was subsequently lost before a picture could be taken. However, my separate hand notes informed me I completed a series of six shots that grouped pretty well

but were about 7-8” above the bullseye with no more room for adjustment in the rear sight.

January 18

Upon looking back at my targets from the day prior I realized I would’ve been better off tuning the iron sights at 25-75 yards before stepping out to the 100 yard range. At the time, I found it hard to step back to the shorter ranges when some of the shots were good.

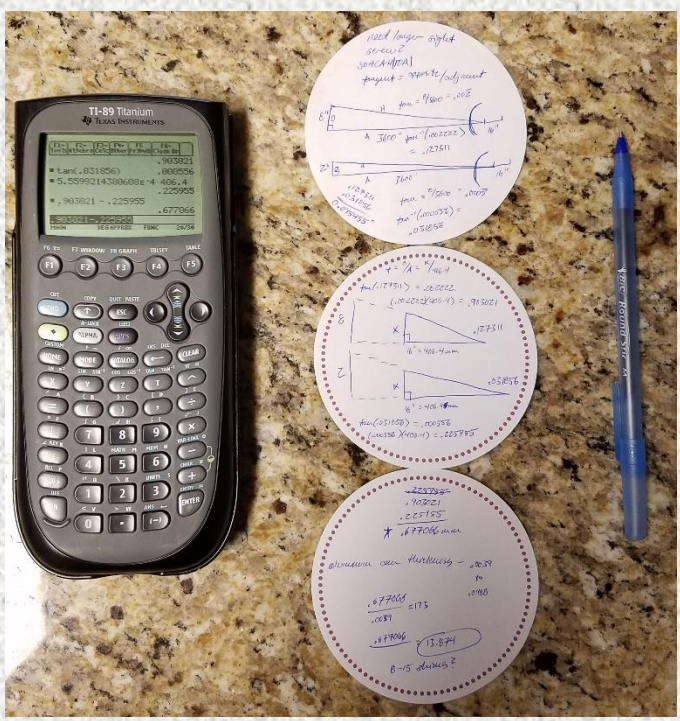
With the forecast predicting strong winds all day I decided it was best to stay home. I took the opportunity to call T/C Customer Service to ask if they had any recommendations for how to bring down my average POI without voiding my warranty on the gun. The customer representative offered no legitimate help, so I sent them a lengthy e-mail describing my situation in the hopes someone more informed (one of their engineers or machine workers) would be able to offer me some advice I could work with. (Refer to Appendix 1 for my questions to T/C.)

January 19

In the meantime, I could still perhaps figure out how to make the projectiles impact where I needed them with my own solution. After consulting with my dad, we agreed there were really only two options. First, I considered removing material from the bottom surface of the rear sight. That would be a risk as it would require using sandpaper wrapped around a socket that perfectly matches the barrel’s outside contour…

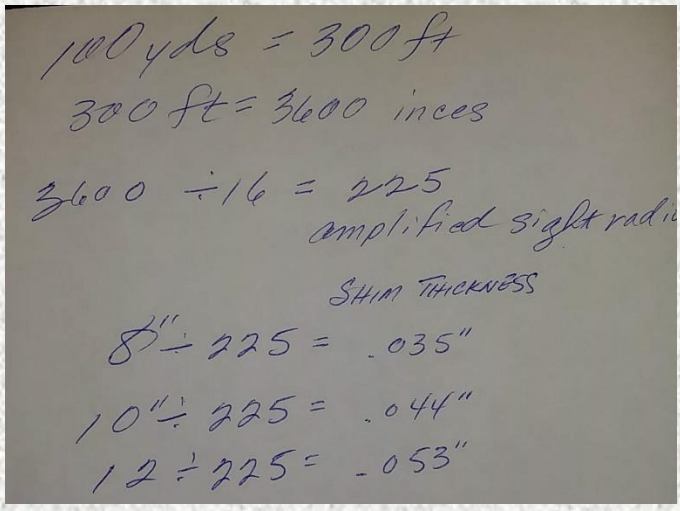
…or, I could add material to the front sight. I decided on the latter in the form of shims. That would allow me to confirm the proof of concept, preserve the sight’s original design and integrity, and protect my warranty until T/C responded with a better solution.

A little research on the Internet was all it took to determine a range for the average thickness of most aluminum cans. I then took those values and knocked the dust off my old calculator.



My high school trigonometry skills came in handy when I calculated the minimum number of shims needed to change the POI from 8” high to 2” high at 100 yards. I chose my POI to be 2” high at 100 yards to match what I figured my final tuning with the scope would be. I determined 8-15 total shims should do the trick.

My dad, the wily old cat he is, took a more direct route to the solution. Maybe, just maybe, the old man still has some tricks up sleeve I don’t know about.



The “16” in his methodology refers to the sight radius, in inches, of the T/C Impact. Therefore, there are 225 units of that 16” distance to reach the target at 100 yards. He then divided 225 into three different changes in POI at that 100 yard distance to determine the shim thickness needed to accomplish that change.

Between the two of us using different methods (without either of us seeing the other’s calculations beforehand, I might add) we were able to arrive at the same answers

to within 1/100,000th of an inch … a pleasant and reassuring surprise to say the least.

Follow me with this:
My methodology resulted in needing a total shim thickness of 0.677066 mm to bring the POI down from 8” to 2” high at a 100 yards, a difference of 6”.

Had my dad done the same conversion with 6” using his methodology … 6”/225 = 0.02667”

0.677066 mm = 0.02666”

In actuality, I knew I would need more shims than our minimum calculations indicated in order to prevent the rear sight from being bottomed out and bring it closer to the middle of its adjustable range. It’s better to have the sights set so that there is plenty of adjustable range both up/down and left/right in order to accommodate multiple load combinations without being maxed out at either end of the spectrum.

With a plan in place, it was time to leverage 140 calories into delivering my 240 grain bullets into a more appreciable downrange POI.

Nearly any ordinary one-hole punch will make clean holes for sight screws to go through.

The shadow image below illustrates how thin an individual shim layer is.

The following image on the next page shows how nearly 20 shims combined would only raise the front sight 2 mm. Downrange, however, that difference would be enormous.

Below is picture of all of the shims stacked on top of one another ready to be installed.

Unfortunately, my shims were “fugly” to say the least. The curvature of the barrel did not take up nearly as much of the width as I expected.

The top down view best illustrates my poor estimation.

January 20

It was time to do some final trimming. A razor blade doesn’t cut through the aluminum, but it makes a clean and precise guide for the tin snips to follow.

I then had nineteen nearly identical shims to stack under the front sight.

As you can see, the final dimensions made for a much more professional looking product.

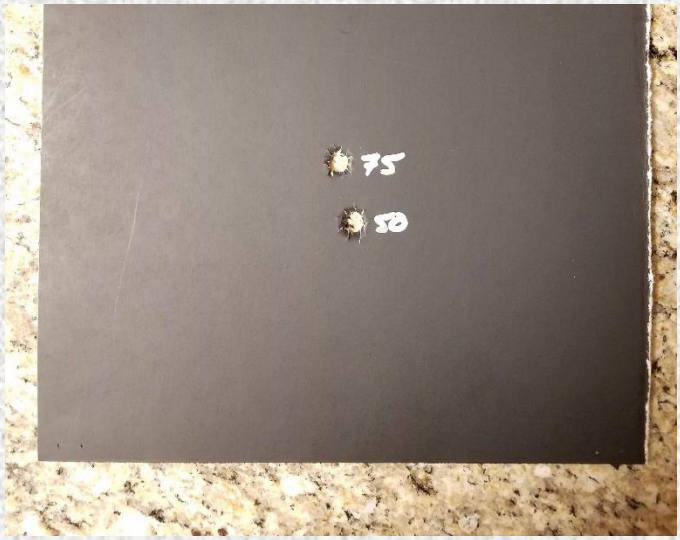
You can't even see the shims now!

A replacement broadhead blade container served equally well as storage for the shims. Most importantly, it kept them from being bent out of shape.

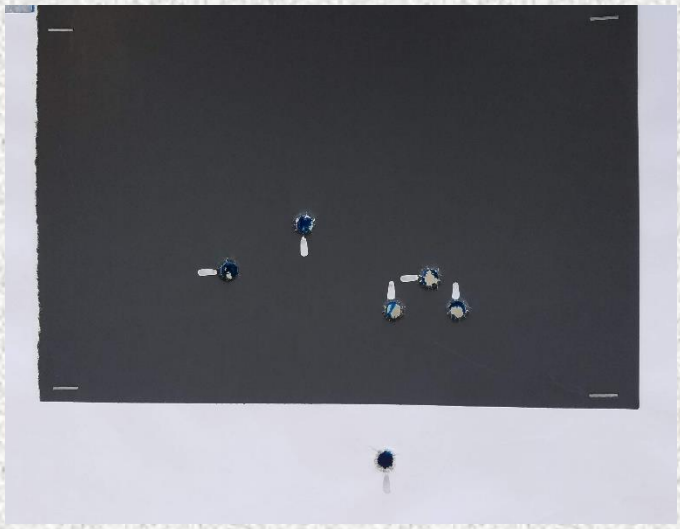
January 24

I decided six shims were a good starting point for a trial trip to the range.

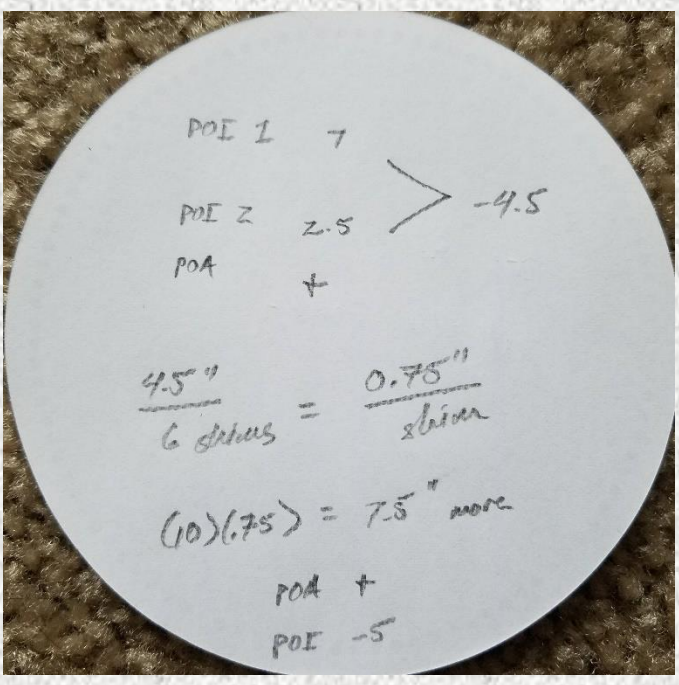
At 50 yards I hit 4" high. At 75 yards I hit 5" high.



At 100 yards 5 of 6 shots were 1.5-3.5" high.



The six shims changed my average POI at 100 yards from 7" high to 2.5" high. That meant each shim, on average, brought down the POI 0.75". I estimated I would need ten more shims to bring the POI down enough for me to move the rear sight closer to the middle of its adjustable range.



I made a trip to the only local gunsmith who had screws with the correct dimensions for the sight screw holes and bought four of them. You might be wondering why I bought four of them when the front sight only requires one. I did so because a) there's always the potential for losing a couple of them and b) most importantly, I knew I would need extras if they were too long and forced me to trim them down. At less than $1 each, I would rather have multiple attempts at trimming them down just right than having the pressure of making the first one perfect.

Of course, I immediately went home and added another ten shims to the front sight in conjunction with using one of the new longer screws.

January 29

Dad and I agreed layering shims was no longer a reasonable solution. The stability decreased with every shim, and the front sight wiggled no matter how much I tightened the screw. The only possible solution at this point would be a solid block shim of the perfect height that also perfectly matched the outside contour of the barrel, thereby allowing the sight to lock down properly.

February 3

I used a digital caliper to measure the sight height as it comes from the factory as a reference and sent that information along with my range findings to T/C Customer Service in a second, more detailed e-mail.

February 6

T/C responded with a prepaid shipping label.

I called to ask if sending only the sights would be sufficient. They kindly said no, that warranty claims require the whole muzzleloader be shipped back.

Not interested in allowing T/C to waste my time and pull a fast one on me, I scratched the underside of the front sight with a razor before screwing it back onto the gun so I would know if it was replaced with a different one.

February 8

I shipped the gun back to T/C via FedEx and included copies of both prior e-mails in the box so that the gunsmiths could be as informed and updated as possible with my situation. I figured the more information they have, the more likely they'll be able to help me come to a solution.

February 15

The gun arrived at the T/C factory in the morning.

February 20

T/C e-mailed me the RMA number for my claim.

March 5

I called T/C to check on the status. They could only tell me it was logged in for repair with a turnaround time of up to six weeks.

March 30

I received an e-mail with shipping information from FedEx. I called T/C for the service update, and they told me the gun now has new "special" front and rear sights, which were simply different sights from one of their other gun models that also fit the Impact's screw hole arrangement.

April 6

Finally, I received the gun from FedEx. I was appreciative of T/C also returning the original set of iron sights along with an extra breech plug.

April 11

With both the new front and rear iron sights on the gun, I bore sighted the gun at 25 yards. Unfortunately, with the rear sight as high as possible and the adjustment screw barely gripping the ramp, the bullets were barely impacting where I needed them to hit. In other words, I now had the exact opposite problem as before. To top it off, I forgot to bring the original sights with me to mix and match at the range.

April 16

I e-mailed T/C a thank you letter for their efforts and asked them how they recommend removing the front sight that was held in by what I guessed to be some sort of epoxy.

April 17

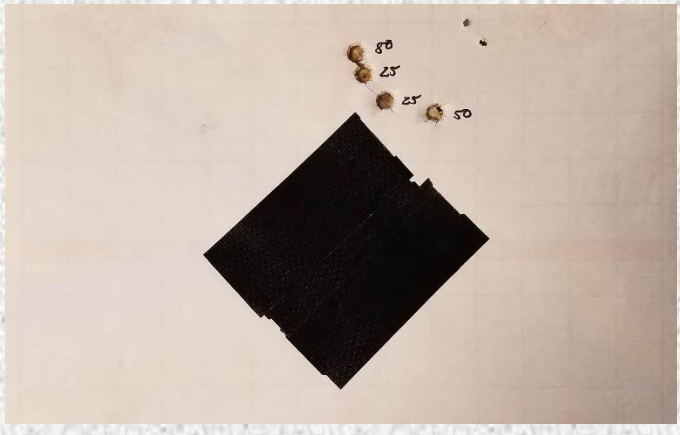
T/C responded and said it's most likely either blue or green Loctite, and they recommend YouTube for how to break it free…gee, thanks.

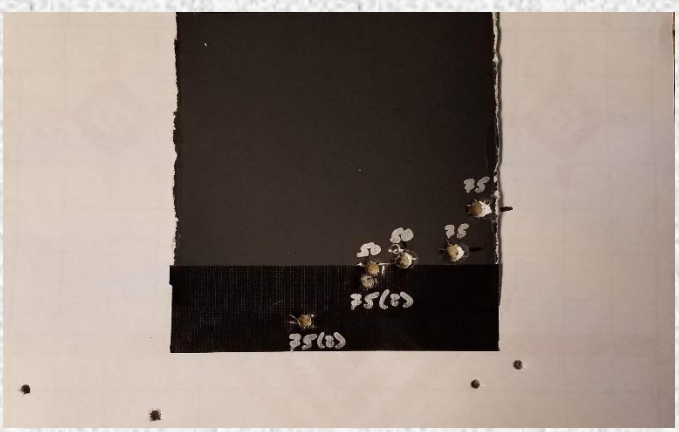
April 19

With the help of a heat source, razor blade, and some nail polish remover I was finally able to break the sight screw free and swap it with the original factory sight.

April 25

The combination of the original front sight and new rear sight allowed for plenty of adjustment both up and down in elevation.



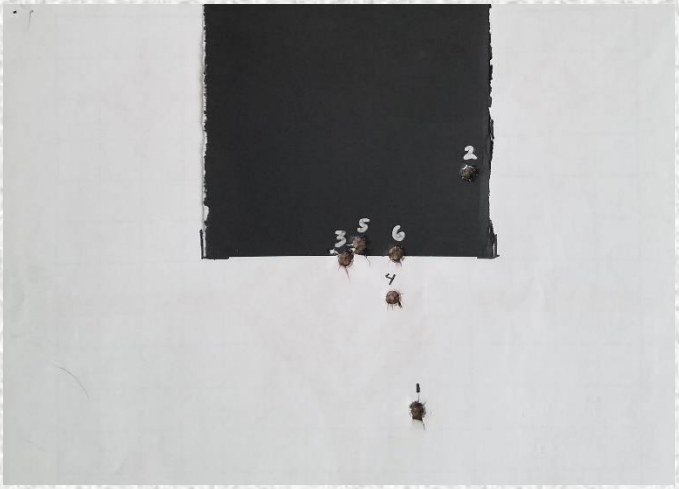


I was then able to quickly tune the iron sights at an acceptable POI at 75 yards, denoted by the two shots labeled as 75(2) for my second group at 75 yards.

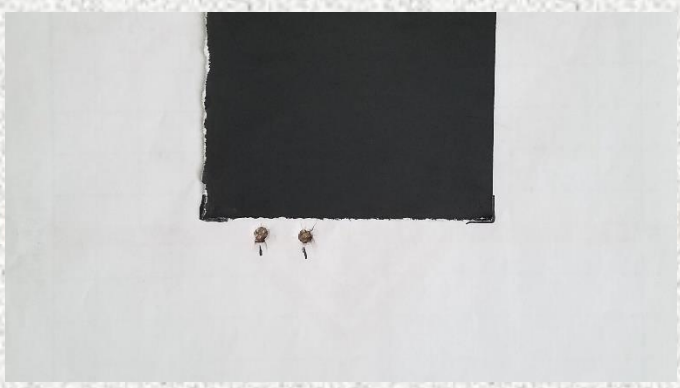
June 22

After nearly a month since shooting it last, I decided the best way to maximize my efficiency at the range that day would be to clean the barrel after every shot and the breech plug after every third shot.

At a distance of 100 yards, I adjusted the rear sight after the first and second shots before finishing with a four shot group at a nearly perfectly zeroed POI.

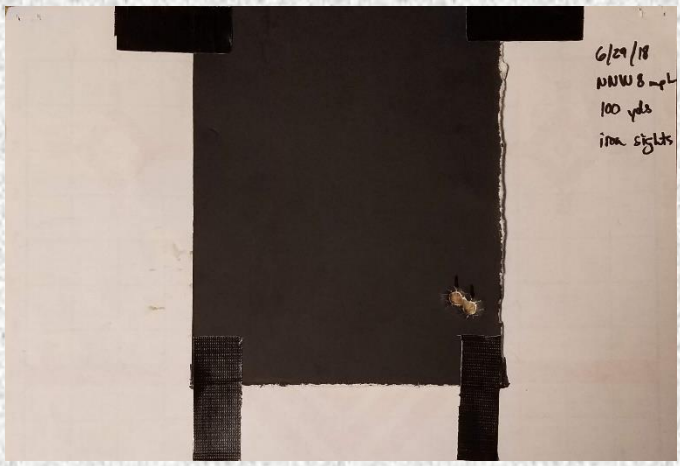


A deep clean of both the barrel and breech plug preceded the following group seen below. Interestingly, the first of a three shot group wasn't even on paper, which I of course found to be peculiar. Unfortunately, that was all the time I had for the range that day.



June 29

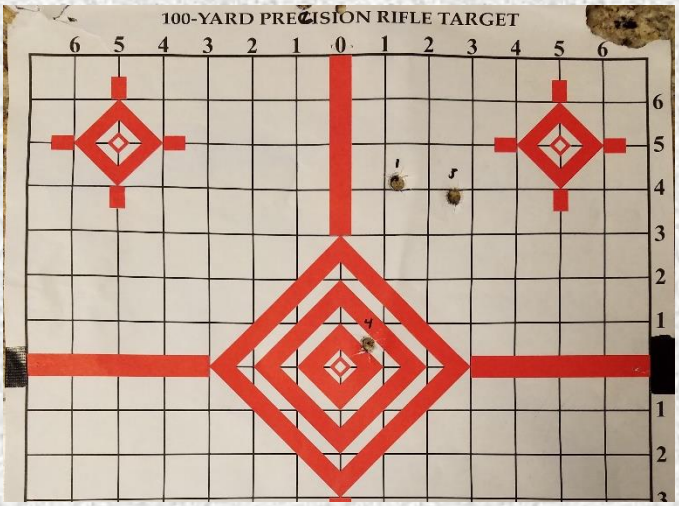
A week later, I was able to finish tuning the iron sights for the elevation that would match where I intended to re-zero the scope.



Though a far cry from being in the middle of its adjustable range, the rear sight was now at an acceptable elevation along the sight ramp, seen in the image on the next page.

A couple more shots and adjustments were all it took to get the irons dialed in where I needed them to be. I then cleaned the gun and mounted the scope back on.

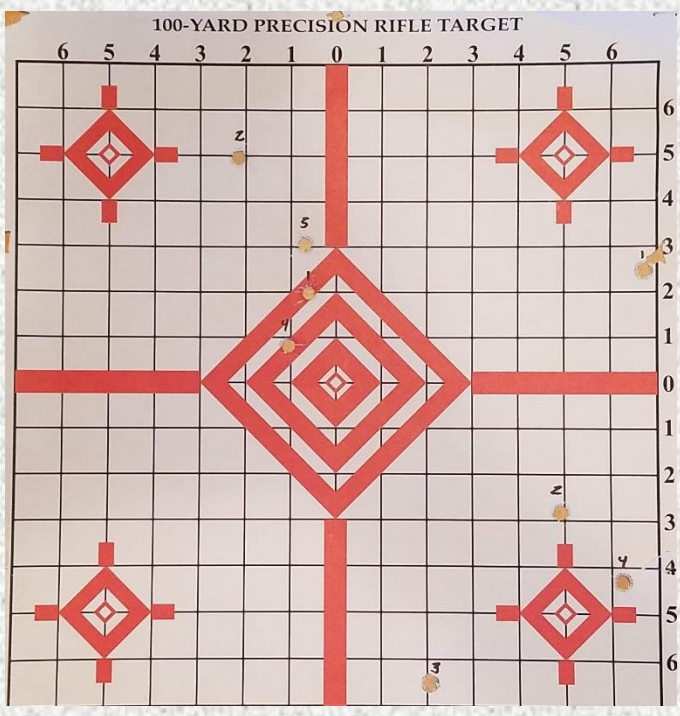
I accidentally adjusted my scope the wrong direction before shooting the second shot, which can be seen clipping the top of the paper above *precision*. A couple shots after that, along with some backtracking scope adjustments, had me really close to where I wanted to end up.



A good barrel scrubbing and breech plug cleaning accompanied a few scope clicks before finishing the day with the target below; a good stopping point for the day.

June 30

In retrospect, this day marked a clear turning point in my journey to super-tuning my T/C Impact. I shot four rounds for the center bullseye, cleaning the barrel between each, and got the following group.



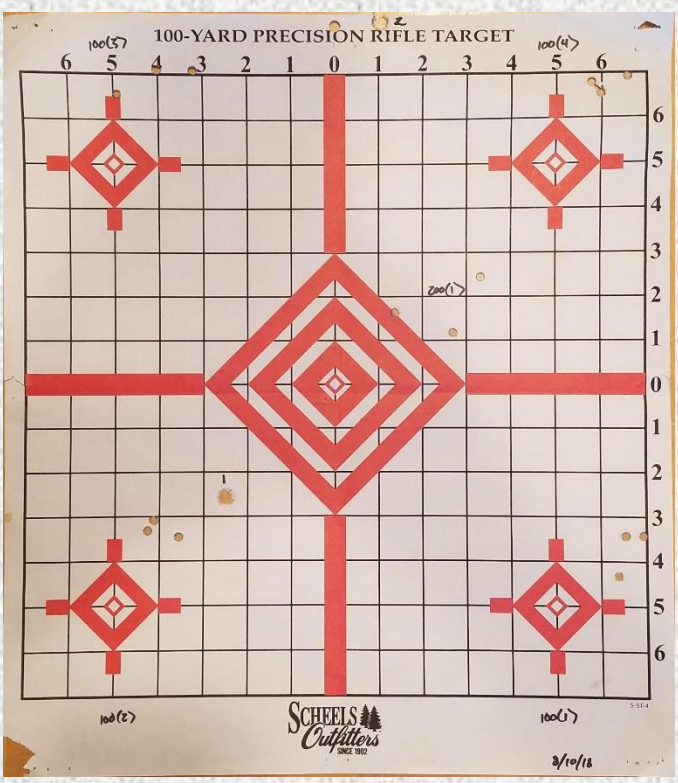
After cleaning the barrel and breech plug I repeated the same routine and got the group seen above intended for the bottom right bullseye. I was befuddled to say the least. Was I really having that bad of a day? The gun surely wouldn't shoot so horrendously on its own.

August 10

A week and a half later found me back at the range, eager to put the last trip out of my mind. The confusion didn't end, however. My first shot hit 2.5" left, 2.5" low. (Ignore the smaller bullet holes from my .223) The second shot was nowhere to be found on paper at all.

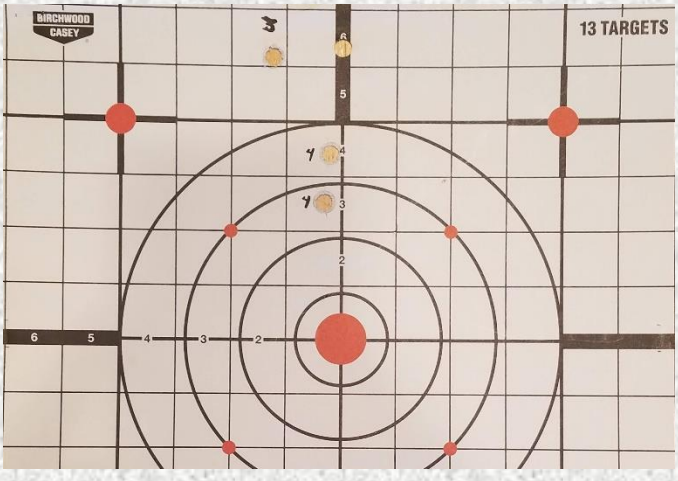
At this point I just sat back and knew something was wrong with the gun or the scope. I know I'm not that bad of a shooter when I've proven time and again I'm capable of delivering nice groups through various rifles.

I cleaned the gun and adjusted the scope 18 clicks up and 10 clicks right. Based on the first shot this would get it back to dead center 2" high, if that even mattered at this point.



I then completed another two shot group that only landed one bullet on paper, just clipping the top edge above *rifle*. Again, the second shot was the one to miss paper. At least there was a small pattern of the dirty barrel shots missing paper. Though I didn't remember dropping the gun or knocking the scope at any point in time, it seemed my scope's crosshairs and adjustments were out of whack.

I decided another couple two-shot groups were in order to finally nail down what the issues was. A good barrel and breech plug scrubbing was completed before adjusting the scope 6 clicks down and 2 clicks left. I figured small adjustments might be the better decision with how erratic the gun was shooting. Groups 3 and 4 can be seen in the next image.



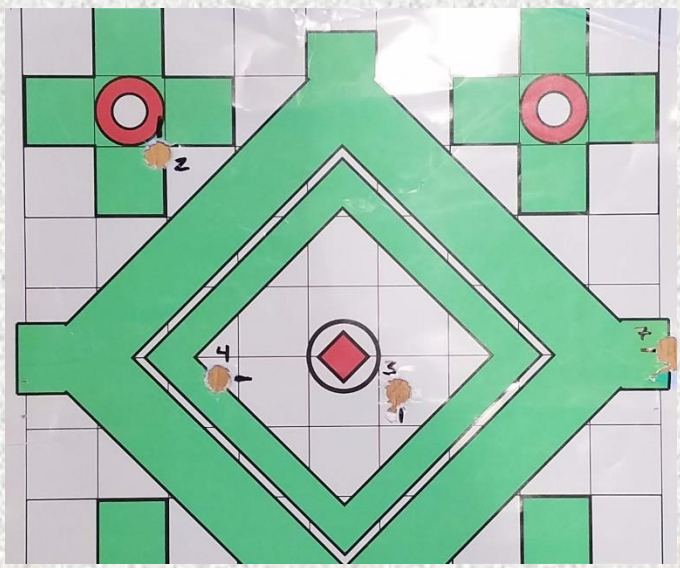
My first shot for Group 3 hit a reasonable spot on target based on the previous scope adjustments, so I decided to be aggressive and adjust the scope once again 6 clicks down. Yet again, the second (dirty barrel) shot wasn't even on paper.

I switched up the routine by cleaning the barrel and plug between both shots in Group 4 and got a surprisingly good group. Though relieved to have narrowed down the potential issues I was nonetheless a bit mentally drained and decided to end the day on a mediocre note.

September 21

It wasn't until nearly a month and a half later that I was able to make it back to the range. Unfortunately, my patience was rewarded with only more frustration and confusion.

Round one missed the paper completely, an abysmal start to be sure. Round two hit 3" high, 2.5" left. A scope adjustment of 12 clicks down paired with a deep clean saw round three barely miss the bullseye.



Like the past couple trips, it seemed a complete barrel and breech plug cleaning were needed to have any remote idea of knowing where the bullets would impact, so that's what I did between each of the next five shots.

Right on cue, shots 5, 6, and 8 were all off target. This made the third visit in a row that shots were erratic and unpredictable. Fortunately, I had an ace up my sleeve. I pulled out my trusty .270 WSM and fired a two shot group at 100 yards.

Bingo! They made a ½" group look easy! A few clicks left in the scope brought my POI right where I last left it the year prior. Just like that, I was confirmed and ready for the general rifle season, minus a few 200 and 300 yard practice shots right before the hunt. In shooting my centerfire I also verified my muzzleloader woes were not rooted in me. Either the Impact itself or the scope it was wearing was the issue because my loading procedure never varied and my cleaning procedure only minimally.

September 22

This day in history left us nothing worth seeing again. Five of six shots completely missed a large 2 ft. x 2 ft. target at 100 yards. In discussing and brainstorming about it with my dad afterward he asked which breech plug I had been using. I had been using the extra breech plug T/C sent ever since the Impact returned, so that might explain part of the problem. However, we both agreed there was no way a simple breech plug swap would result in the horrendous performance I continually witnessed the last couple months.

September 23

The next day, I decided a complete re-installation of the scope was in order. I removed the scope, rings, and base from the rifle and then re-secured them in reverse order as if it was a brand new muzzleloader and scope. Furthermore, I adjusted both the elevation and windage to the exact middle of their respective adjustable ranges. Of course, I also made sure to swap back to the original breech plug that came with the gun. I even inspected the crown and rifling of the barrel. From what I could see, the entire length of the barrel was clean and pristine. Lastly, I scrubbed and cleaned the barrel with a bore brush wrapped in steel wool. The steel wool was effective at removing the tiniest bits of powder and sabot shavings that were trapped in the grooves.

You might be wondering why I didn't simply mount a different scope on the Impact and see how it shoots. Plain and simple, I was confident in knowing I never jarred the scope, either directly or indirectly, out of whack. I trusted my judgment enough to believe the scope's internals were perfectly fine.

Despite my confidence, it was a bit of a gamble as the opening of the Utah general muzzleloader season was in just three days.

September 24

I wasn't able to go to the range until after work, which only left me a couple hours of light. The range I normally go to isn't open on Mondays or Tuesdays, so I had to resort to a smaller range I had never been to with less benches. This would make competition for a bench amongst all the other procrastinating hunters an extra hurdle I didn't need. I wasn't a procrastinator, though. I was one hurdle away from finishing this muzzleloader tuning journey and getting the reward of finally being on the hunt for a bruiser buck. I did my best to go in with a clear head and the mindset that this was a new muzzleloader, so I started at the 25-75 yard range.

The first shot at 25 yards was dead center 2" high. Because I was using targets that had already been shot up a little I wasn't totally sure where my follow up shot at 50 yards impacted, but it looked like it was 2" high, 1" right. If so, it appeared the Impact was at least showing a good start to the day. I didn't want to get hasty, however, so I deep cleaned the gun and shot again at 25 yards. The bullet hit a mere ½" left of the bullseye, so I started to feel a little positive energy building in my hopes for the day. What followed was a six shot volley of bullets at 25 and 50 yards that would make a shotgun laugh. That was the straw that broke the camel's back

This forced me into one last Hail Mary decision – buy a new muzzleloader or buy a new scope?

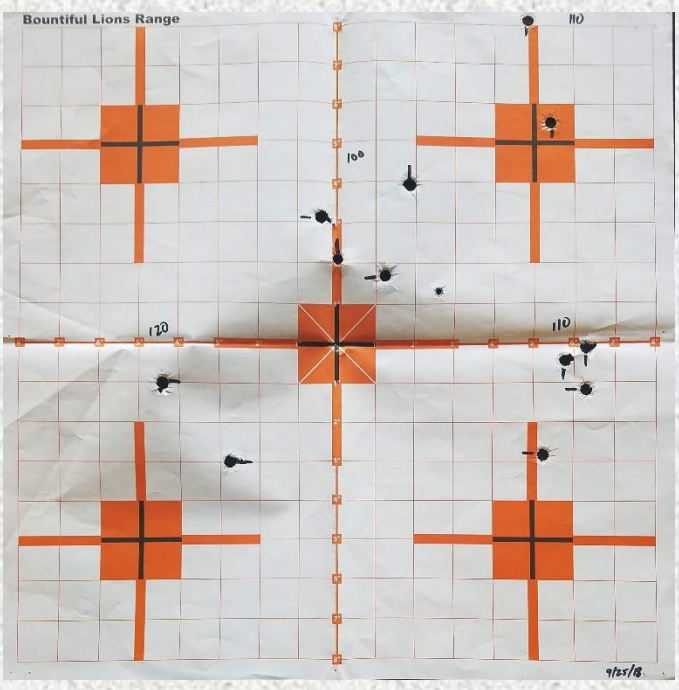
I walked into Sportsman's Warehouse with empty hands and came out carrying a yellow box with a brand new CVA smoke pole inside. I decided a roll of the dice with the bigger price tag of a muzzleloader was no roll of the dice at all. I maintained confidence my scope was fine and I could trust it to serve as the eyes of this new beast called the Optima V2.

I got home late from the store but still had to mount the scope with the only set of bases Sportsman's had that would accommodate my new smoke pole's screw holes. In order to do so, I was forced to remove the rear iron sight from the gun. To be honest, I wasn't complaining as I was fed up with tuning iron sights. I removed the front sight as well, tightened in the filler screws, and admired my sporty new setup. The next day would bring a clean slate and renewed hope.

September 25

It was a good thing I had already scheduled this day off work. I initially planned to spend this day traveling, setting up camp, and scouting where I intended to hunt the next morning. Instead, I was going to the range with a new gun. My confidence was neutral, but my hopes were high.

With much still to do after, hopefully, tuning the new gun I decided to only test three different powder charges (100, 110, and 120) and make due with whatever they revealed to me.



A short time later I determined the Optima V2 seemed to shoot the 110 grain load the best. It was a little bit of a judgment call without a clear winner, but I thought 110 grains showed the most potential for consistency, so that's the load I selected. All of the shooting components were the same products I used throughout the process with the Impact.

The only other thing I could do in my short time frame was shoot a couple groups at 200 yards and see what happened. I was pleasantly surprised with the results. The first group is denoted with ticks at the bottom of the bullet holes, and the second group has the ticks on the left. A quick scope adjustment to the windage centered everything up and ready for the next day's hunt.

Though some might consider it a risky decision determining whether to trust the Impact or the scope, my confidence was enough to spur me to go with my instincts and it paid off. The gun was at fault, and the scope was perfectly trustworthy. Perhaps, I should've just purchased a different gun earlier and been done with the headache, but that's easier said than done. It's hard to give up on a gun that had proven numerous times earlier it was capable of good accuracy, but it was officially time to move on.

In my delight and relief, I texted my dad the good news with the CVA's performance and how it grouped at the various distances. Before I even got back home he had responded with a ballistics chart that was back-calculated using the POI's I gave him in combination with the ballistic coefficient of my bullets. Unsurprisingly, the velocities are right about what I would've guessed for my particular setup. However, I was surprised at seeing how doable a 250 yard shot would be on a deer. A 20" drop is very manageable along with plenty of downrange energy to boot!

Range (yd)	Drop (in)	Wind Drift (in)	Velocity (fps)	Energy (ft-lb)
0	-1.5	0.0	1875	1873
25	0.5	0.2	1804	1734
50	1.7	0.7	1735	1604
75	2.3	1.4	1668	1482
100	2.1	2.5	1603	1369
125	1.0	3.8	1539	1263
150	-0.9	5.5	1478	1165
175	-3.9	7.5	1420	1075
200	-8.0	10.0	1366	994
225	-13.2	12.9	1315	921
250	-19.7	16.0	1266	854

November 2

By this point, I felt I had experienced my fair share of muzzleloader shooting, cleaning, and tuning for one year. To be frank, I was worn out on the whole project in general. Both the general muzzleloader and rifle seasons were over, but I still had a nagging desire to go to the range with the Impact one last time. I just didn't understand how it went from shooting so well to so horribly without any indication as to why, so I wanted to give it one last chance to prove itself without the pressure of a looming hunt. I was sorely disappointed.

The first shot was at 25 yards, and the next three shots were at 50 yards. The first three revealed no sort of pattern, and the fourth shot completely missed paper.

I deep cleaned the barrel and swapped to the other breech plug for good measure.

One of four shots were off paper at 25 yards, and one of two shots at 50 yards was also completely off the target

It was official. After roughly 220 rounds, those were the last rounds I would ever shoot through the T/C Impact. The only things that lay ahead for me and that gun were one last deep clean and a willing buyer. Yet again, I inspected the Impact's rifling and crown only to find what appears to be a perfectly good barrel. I guess I just find it … weird … that it stopped shooting well upon its return from the T/C factory.

I remounted the scope on the CVA Optima V2 and squeezed off a couple quick shots at 25 and 75 yards before jumping over to the 100 yard range.

What commenced at the 100 yard range that day was nothing short of a perfect ending to my smoke pole sight-in saga. Two great groups, seen on the next page, was the perfect way to end the season.

Though I was already confident in my determinations before, there was still a voice in my head that wondered if there was something I was doing that made the gun shoot erratically. After shooting both guns back-to-back, with the CVA and increased shoulder fatigue going second no less, I found sweet relief in knowing there was nothing I could've done to make the Impact shoot correctly. All the screws, mounts, rings, etc. were snugged down and never budged throughout the tuning process. I immediately followed it up with great performance in the CVA Optima V2 using the exact same scope, routine, and components.

Finished Product & End Results:

For as well as a muzzleloader can shoot with a load it likes, we must remember they are certainly no centerfire rifle. Fortunately, I found one that shoots minute-of-buck with ease.

Though a mighty struggle it was, both the Impact and Optima V2 showed the potential to shoot remarkably well. And from "budget" smoke poles no less! Only one primer, one powder, one sabot, and one bullet were used during the whole process, all of which are some of the more plain Jane, but time-proven, standards of each component.

I hope to continue testing other combinations next year, though I wonder how I can top the performance I've already witnessed and proven both at the range and in the field.

The Impact confirmed to me it isn't even worth keeping as an acceptable 50-75 yard backup gun, so I will happily part ways with it. You might be wondering why I don't hold onto it and try new load combinations next year. My reasoning is if it won't shoot my basic, common load into a softball sized group at 50 yards, then it's not even worth my time to keep experimenting.

I am left to wonder if all the abrasion and chemical applications throughout the dozens of cleanings combined to reduce the rifling effects. Surely not, as there are only about 220 rounds through it, and the rifling still looks brand new from what I can see.

Future Projects:

Through my online research I never found other people who reported also having issues with tuning their Impact's iron sights. It has been in T/C's lineup since 2010, and that only happens if it's a good gun lots of people have found favor with. For those who want to upgrade their Impact's iron sights, some options worth considering include Williams Gun Sight's 'FP', 'WGRS', and 'Ace In The Hole' sight models.

As for the CVA Optima V2, I could get some higher scope rings in order to re-incorporate the iron sights, but I prefer the scope to be tucked down closer to the barrel. For now, I'll opt to go without the irons and leave in the finishing screws.

However, I could experiment with any variety of primers, powders, sabots, and bullets. Surely, there's a combination out there that would squeeze my groups down to ¾". A man by the name of Tom Armbrust pieced together an impressive and useful comparison of 209 primers in his article, *Shotshell Primer Substitutions Affecting Patterns*. In his article, Armbrust explains how even a simple change to a different primer can yield tremendously different results.

One last component open for experimentation is the breech plug itself. CVA offers factory made plugs specialized for use with new low-residue powders and state hunting regulations that require an 'open breech'. Another popular option across many makes and models of muzzleloaders has been converting breech plugs to be used with pistol primers, most notably the 25 ACP.

Whatever direction I choose to go is to be determined at a later date. For now, I'm happy to take a break from the muzzleloader adventure.

Supplemental Information:

I put a piece of tape on the ramrod that marks how far down the bullet is seated with a clean barrel and breech plug. By shot three, I can sometimes only seat the bullet ¾" higher than it should be as compared to the clean barrel and breech plug shot. Just goes to show: you don't have to be perfect, just perfectly *consistent* to obtain precision and accuracy in your muzzleloader.

As a reference, the picture above is the T/C Impact broken down for cleaning.

The next image is the CVA Optima V2. Though the Impact is very easy to take apart and clean, I found the Optima V2 breaks down just a little further for deeper cleaning.

From the time I was gifted the Impact to the time I deemed it a lost cause was a lengthy 10 and a half months to the day. A centerfire rifle with smokeless powder presents a significantly quicker tuning (i.e. cleaning) process, but part of the fun in shooting muzzleloaders is they force you to slow down and appreciate each step that goes into completing the process, especially when your smoke pole proves it is capable of precision and accuracy that rivals those of centerfire rifles.

Appendix 1

Questions for T/C:

Has T/C had reports of other Impact guns with the same issue I am experiencing?

What is the center-to-center distance of the rear sight holes as comparted to the scope base holes?

Do both screw holes noted above have the same thread pitch?

What are the thread dimensions for the front and rear sights?

What is the barrel diameter?

Is the barrel the same diameter for its full length?

Does T/C know of and recommend a particular after-market rear sight that fits the scope mount holes?

Project contributors:

A special thanks goes out to Mark Maichak, Val Eaves, and Dempsey Davenport for serving as knowledgeable, experienced, insightful consultants.